

# Number Talks for Algebraic Thinking

---

Madeleine Jetter

CSUSB

MaTHink 2011

Riverside, CA

# Outline

- What is a number talk?
- Watch a number talk
- Try one together
- Scaffolding a number talk
- Number talks and algebraic thinking
- Practice and create your own

# What is a number talk?

- A whole-class activity centered around mental math tasks
- Students explain and justify their solution strategies
- Teacher acts as facilitator
- Time required: 5-10 minutes

# Watch a number talk: $32 \times 15$

- How would you mentally calculate  $32 \times 15$ ?
- Try solving in two or more ways. Record your strategies using numbers or pictures.

# Watch a number talk: $32 \times 15$

How does this teacher:

- Use wait time?
- Assess understanding?
- Record student thinking?
- Extend student thinking?

How do these students:

- Show computational fluency?
- Show flexible thinking?
- Connect the problem to others they know?

# Let's try another

- Calculate mentally:  $496 \div 8$
- “Thumb up” for one strategy, two fingers for two strategies, etc...
- Be prepared to explain how you found the quotient.

# Scaffolding

- Suppose you wanted a group of 5th graders to find the previous quotient mentally.
- What easier questions would help students build towards the quotient of  $496 \div 8$ ?

# Components of Algebraic Thinking (Kriegler)

## Mathematical Thinking Tools

### Problem solving skills

- Using problem solving strategies
- Exploring multiple approaches/multiple solutions

### Representation skills

- Displaying relationships visually, symbolically, numerically, verbally
- Translating among different representations
- Interpreting information within representations

### Reasoning skills

- Inductive reasoning
- Deductive reasoning

## Informal Algebraic Ideas

### Algebra as abstract arithmetic

- Conceptually based computation strategies
- Ratio and proportion

### Algebra as the language of mathematics

- Meaning of variables and variable expressions
- Meaning of solutions
- Understanding and using properties of the number system
- Reading, writing, manipulating numbers and symbols using algebraic conventions
- Using equivalent symbolic representations to manipulate formulas, expressions, equations, inequalities

### Algebra as a tool to study functions and mathematical modeling

- Seeking, expressing, generalizing patterns and rules in real-world contexts
- Representing mathematical ideas using equations, tables, graphs, or words
- Working with input/output patterns
- Developing coordinate graphing skills



# Components of Algebraic Thinking (Kriegler)

## Mathematical Thinking Tools

### Problem solving skills

- Using problem solving strategies
- Exploring multiple approaches/multiple solutions

### Representation skills

- Displaying relationships visually, symbolically, numerically, verbally
- Translating among different representations
- Interpreting information within representations

### Reasoning skills

- Inductive reasoning
- Deductive reasoning

## Informal Algebraic Ideas

### Algebra as abstract arithmetic

- Conceptually based computation strategies
- Ratio and proportion

### Algebra as the language of mathematics

- Meaning of variables and variable expressions
- Meaning of solutions
- Understanding and using properties of the number system
- Reading, writing, manipulating numbers and symbols using algebraic conventions
- Using equivalent symbolic representations to manipulate formulas, expressions, equations, inequalities

### Algebra as a tool to study functions and mathematical modeling

- Seeking, expressing, generalizing patterns and rules in real-world contexts
- Representing mathematical ideas using equations, tables, graphs, or words
- Working with input/output patterns
- Developing coordinate graphing skills

# Practice a Number Talk

- Work with a partner (or two)
- Choose a problem from the next slide
- Solve your problem using more than one strategy
- Explain your strategies to your partner in words a child might use. Record your partner's thinking by writing number sentences, diagrams, etc.
- Reflect on the problem. How would you scaffold or extend for your own students?

# Practice a Number Talk

- $4+8+6+2+7$
- $37+69$
- $298+297$
- $1000-674$
- $12 \times 15$
- $852 \div 3$
- Which is larger? or ?  
 $\frac{3}{8}$   $\frac{1}{2}$  or  $\frac{4}{7}$   $\frac{3}{8}$
- Order from least to greatest:  $\frac{3}{4}, \frac{5}{8}, \frac{3}{7}$

# Create a Number Talk

- Think of a skill you want your students to develop.
- What tasks might encourage a student to develop that skill?
- What tasks might encourage a student to extend that skill?

# Create a Number Talk

A few ideas:

- Adding by regrouping or compensating
- Subtracting by adding up or keeping a constant difference
- Multiplying by doubling
- Estimating/comparing/ordering fractions using benchmarks

# Recommended Resource

Sherry Parrish

Number Talks

Math Solutions

Sausalito, CA, USA

QuickTime™ and a  
decompressor  
are needed to see this picture.



**Thanks!**

